

# PATENT SPECIFICATION

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## (54) LIQUID MIXER DISPENSER

(71) We, R. F. ELECTRONIC CONTROLS (1970) LIMITED, a British Company of 4B Wingate Trading Estate, 784-792 High Road, Tottenham, London N.17, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The invention relates to a liquid mixer dispenser and is particularly applicable to a detergent proportioner for supplying detergent to water coming from a tap.

15 According to the invention, there is provided a liquid mixer dispenser comprising a housing having an inlet passage for a main liquid, an outlet passage leading to a discharge orifice and having a mouth aligned with the inlet passage to receive main liquid issuing from the inlet passage, an air gap which separates the inlet and outlet passages and is open to the exterior of the housing, an auxiliary passage for a liquid additive opening into the outlet passage at the location of an enlargement which is provided in the outlet passage downstream of its mouth for drawing liquid additive from the auxiliary passage into the outlet passage in proportion to the quantity of main liquid reaching the discharge orifice, and a hole of larger diameter than the auxiliary passage and intersecting same, the hole containing a slide rod which is provided with an annular groove that can be brought into or out of registry with the auxiliary passage by sliding the rod axially, whereby positively to permit or prevent the flow of additive through the auxiliary passage.

40 In the use of such a dispenser, main liquid from the inlet passage jumps the air gap to reach the outlet passage. However, by reason of the air gap communicating with the atmosphere, no liquid can reach the inlet passage from the outlet passage. Thus, if for some reason a suction effect happens

to be set up in, say, water mains to which the inlet passage may be connected, only air will be sucked in from the air gap and the mains will not become contaminated with the liquid additive.

An example of the invention will now be described with reference to the accompanying drawings, in which:—

Fig. 1 is a perspective view of a dispenser suitable as a detergent proportioner;

Fig. 2 is an underplan of the Fig. 1 proportioner;

Fig. 3 is a cross-sectional view through the housing of the proportioner, and

Fig. 4 is an enlarged cross-sectional view through an insert member of the Fig. 3 housing.

Referring to the drawings, a detergent proportioner comprises a housing 10 having an upstream portion 12 and a downstream portion 14 spaced apart by two walls 16 and 18 to define an air gap 20. The wall 16 extends across the whole width of the housing portions 12 and 14 but the wall 18 is narrower and is located centrally of the portions 12 and 14. The air gap is open to the exterior of the housing and hence to atmosphere.

The housing is connectable to a water tap by means of a connector 22 which comprises a rubber sleeve 26 terminating in a collar (not visible) fixed in a recess 24 in the housing portion 12 around a screw-threaded nipple 32 the free end of which may be received in the water tap. The sleeve 22 has resilient internal ribs 28 for sealingly engaging the periphery of the water tap. A metallic sleeve 30 around the rubber sleeve 26 strengthens the connector.

The housing portion 12 upstream of the air gap 20 contains an inlet passage 33 which has a diameter substantially less than that of the tap outlet and is in registry with the bore 34 of the nipple 32. A cylindrical bore 44 coaxial with the passage 33 and of 90

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uniform cross-section larger than the cross-section of the passage 33 is formed in the housing portion 14. An insert member 36 is provided in the bore 44 so that one of its ends is flush with the edge of the air gap 20. Accordingly, an upstream portion of the bore 44 adjacent the air gap is constricted by the member 36 to define an upstream portion 40 of an outlet passage for liquid, a downstream portion of the outlet passage and of larger diameter than the portion 40 being defined by the unconstricted part of the bore 44 immediately downstream of the insert member and leading to a discharge orifice 45. The end of the insert member adjacent the air gap is internally bevelled to define a flared mouth 38 of the outlet passage. In use, the mouth receives a jet of water issuing from the inlet passage 34. The outlet passage portion 40 has substantially the same diameter as the inlet passage 33.

The downstream end of the insert member 36 forms an annular step in the outlet passage where the flow cross-section of the outlet passage is rapidly increased. As water flows rapidly from the outlet passage portion 40 and through the enlarged passage portion 44, suction causes liquid detergent to be drawn through an auxiliary passage 42 which opens into the outlet passage immediately downstream of the step.

It is of course important that the inlet and outlet passages be dimensioned so that a predetermined amount of liquid detergent is drawn into the outlet passage and so that a jet of water issuing from the inlet passage passes accurately into the mouth 38 across the air gap. In the illustrated embodiment, the preferred dimensions are as follows:—

- Diameter of inlet passage 33, bore 34 and passage portion 40 = 0.147 inch;
- Length of air gap 20 = 0.25 inch;
- Inlet diameter of mouth 38 = 0.2 inch;
- Angle of taper of mouth = 12°;
- Total length of insert member 36 = 0.45 inch;
- Diameter of bore 44 = 6.0 mm.

As shown in Fig. 3, a cylindrical hole 46 having a larger diameter than the auxiliary passage 42 intersects same at right-angles. A valve member comprising a cylindrical rod 48 (Fig. 2) having substantially the same diameter as the hole 46 is slidable therein. Knobs 50 are on the ends of the rod 48 that project from the housing. The rod 48 has an annular groove (not shown) and this groove can be moved into or out of registry with the passage 42 in order positively to permit or prevent detergent reaching the outlet passage by sliding the rod 48 axially in the hole 46. The knobs 50 may be marked to indicate which knob must be pushed to permit or prevent detergent flow.

The auxiliary passage 42 in the housing

portion 14 communicates with a hole in a separate connector 52 which can be screw-threadedly engaged in an inlet recess 54 of the passage 42 and which has a nipple 56 for attaching a flexible supply tube for detergent. A throttle member in the form of a needle screw 58 of the connector 52 projects into the hole therein and permits adjustment of the flow area to meter the amount of detergent through the auxiliary passage.

A screw-threaded hollow stud 60 depending from the housing portion 14 in registry with the discharge orifice 45 of the outlet passage receives a retainer 62 for wire mesh 64 through which liquid can pass.

After the connector 22 has been fixed on a tap and whenever the tap is switched on, water flows through the inlet passage 33 and is ejected as a jet which jumps across the air gap 20 into the mouth 38 of the outlet passage. If the valve member in the auxiliary passage 42 is switched on, the water flow creates suction and draws detergent into the outlet passage portion 44 and the water with detergent leaves the proportioner through the discharge orifice 45 and the mesh 64. If the groove in the rod 48 is not in registry with the auxiliary passage, only water will flow through the mesh 64. If the mesh is accidentally covered, water from the inlet passage 34 escapes through the air gap 20. Should there be a momentary suck-back from the mains water supply through the tap, only air will be sucked into the inlet passage 33 through the air gap 20 and detergent is effectively prevented from entering the main water supply.

#### WHAT WE CLAIM IS:—

1. A liquid mixer dispenser comprising a housing having an inlet passage for a main liquid, an outlet passage leading to a discharge orifice and having a mouth aligned with the inlet passage to receive main liquid issuing from the inlet passage, an air gap which separates the inlet and outlet passages and is open to the exterior of the housing, an auxiliary passage for a liquid additive opening into the outlet passage at the location of an enlargement which is provided in the outlet passage downstream of its mouth for drawing liquid additive from the auxiliary passage into the outlet passage in proportion to the quantity of main liquid reaching the discharge orifice, and a hole of larger diameter than the auxiliary passage and intersecting same, the hole containing a slide rod which is provided with an annular groove that can be brought into or out of registry with the auxiliary passage by sliding the rod axially, whereby positively to permit or prevent the flow of additive through the auxiliary passage.

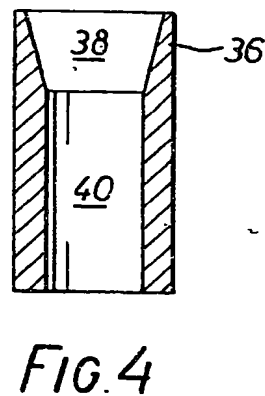
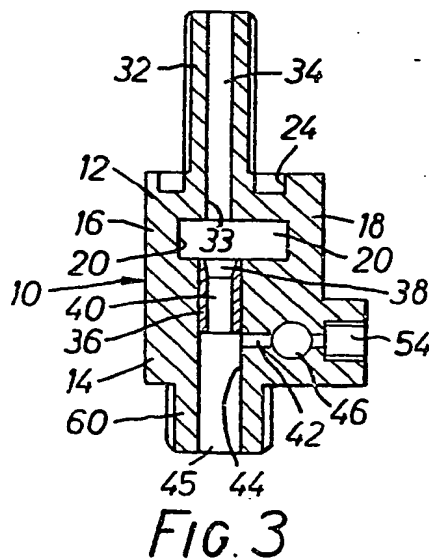
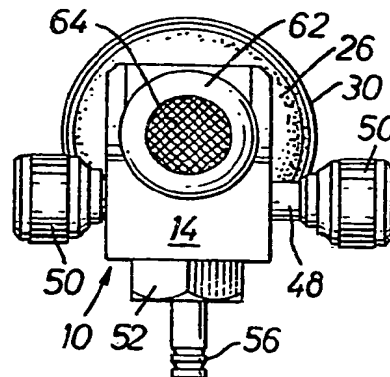
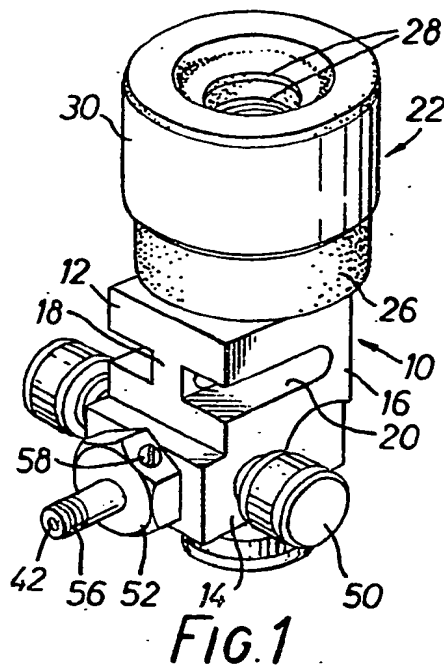
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2. A dispenser according to claim 1, wherein the ends of the slide rod project from the housing and are provided with knobs. 20
- 5 3. A dispenser according to either preceding claim, wherein the housing contains a bore of uniform cross-section leading from the air gap, an upstream portion of the bore adjacent the air gap being con- 25  
10 stricted by a tubular insert member defining an upstream portion of the outlet passage and the enlargement of the outlet passage being defined by an unconstructed portion of the bore continuing on from the insert 30  
15 member.
4. A dispenser according to claim 3, wherein the end of the tubular insert member adjacent the air gap is internally-  
bevelled to define a flared mouth of the outlet passage.
5. A dispenser according to any preceding claim, including a needle screw for metering the flow of liquid additive through the auxiliary passage, the screw being contained in a connector which is engaged in 25  
an inlet recess of the auxiliary passage for attaching a supply tube for liquid additive.
6. A liquid dispenser substantially as hereinbefore described with reference to the accompanying drawings. 30

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